

Instructions for Completing Agreement Exhibit A, Scope of Work

The Exhibit A Template contains the framework to use to complete the Scope of Work. That template has instructions *in blue* that are to be deleted as it is filled out. Alternately, the text in *blue italics* can be optional, depending on the text required for the Scope of Work.

The following are additional instructions for the items in the Scope of Work. At the end of these instructions, there are examples of Technical Tasks to provide guidance in drafting your own.

I. Key Name List

List key parties within the agreement as described below. See Ts & Cs of the contract for more information regarding key parties within the agreement.

Key Personnel are employees or consultants of the Contractor who are critical to the outcome of the project and are being paid with PIER funds. Key Personnel have expertise in the project field or experience that is not available from another source. Replacing these individuals may be difficult due to their expertise and may affect the outcome of the project.

- Since key personnel can come from various organizations working on the agreement, they should be written as follows to avoid confusion: “John Smith – Acme Company”
- Resumes for all key personnel are required as a part of the contract package. The Contractor shall compile these into a separate resume attachment.

Key Subcontractors are contractors, subcontractors, or vendors to the Contractor who are critical to the outcome of the project and are being paid with PIER funds. Key Subcontractors have expertise in the project field or experience that is not available from another source. Replacing these individuals may be difficult due to their expertise and may affect the outcome of the project. Subcontractors who are DVBEs are also considered Key Subcontractors.

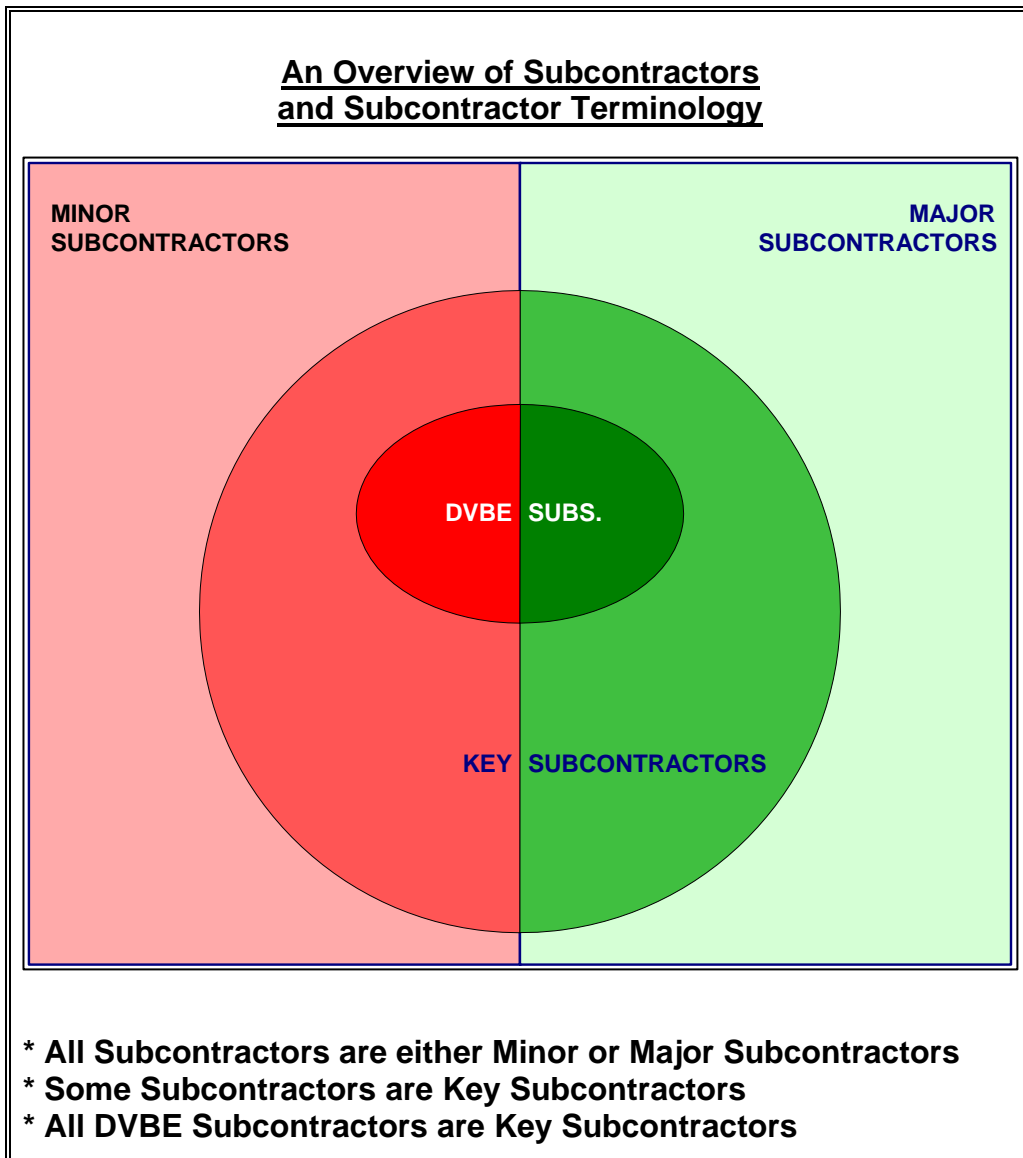
- All DVBE subcontractors are considered key and are to be listed in the “Key Subcontractor” listing with a designation of “DVBE.” For example, “Acme Company – DVBE”
- Note: Individual key employees are listed under “Key Personnel” (see above)

Key Partners are participants in the Project who are not receiving PIER funds and are not providing Match Funds but are integral to the outcome of the Project. Key Partners may be providing space, testing facilities, demonstration sites or may be a manufacturer or other implementer of the Project results.

- Individual key employees from the Key Partner organizations are listed under “Key Personnel”
- “Key Partners” are company names

Major Subcontractors are contractors, subcontractors, or vendors to the Contractor who are budgeted to receive at least \$100,000 or 25% of the total PIER contract funds (whichever is less) and must provide detailed budget forms.

Minor Subcontractors are contractors, subcontractors, or vendors to the Contractor who are budgeted to receive less than \$100,000 or 25% of the total PIER contract funds (whichever is less) and do not need to provide detailed budget forms.



II. Glossary

Spell out each acronym used in the Scope of Work. Also include definitions of odd or unusual terms. Think about the document from the perspective of someone who does not work in the particular industry or discipline.

III. Problem Statement

Succinctly describe the problem that this research will address (1 or 2 paragraphs is fine). Describe the scientific and technological baseline, that is, the current state-of-the-art or the developmental status of the subject technology to be advanced.

Identify entities engaged in development of the subject technology. If no one else is performing any related development work, state that explicitly. Identify whether or not the proposed project duplicates or overlaps with other ongoing RD&D.

Emphasize past advances that you have made in areas relevant to the proposed work. Describe your relevant work, accomplishments, failures, ongoing work, RD&D projects, funding levels and funding sources. Be quantitative and rigorous in the discussion. List research papers, conference papers and presentations with full references, and summarize significant accomplishments that have been reported.

Within the technological baseline discussion, explain the status of the proposed technology in general so as to put it within the context of any larger development effort. The discussion could include factors such as developers and manufacturers, development status (whether laboratory scale, alpha testing, beta testing, commercially available), performance characteristics (efficiency, lifetime, emissions and other environmental characteristics including footprint and land requirement), manufacturing cost and selling price, and operation and maintenance costs.

The scientific and technological baseline described here must facilitate the evaluation of the proposed RD&D effort. That is, there must be continuity between the current status of the subject technology and the proposed effort.

Describe the deficiencies that exist for the subject technology. The deficiencies should illuminate the question of *why* the proposed project should be done.

Identify and discuss the principal barriers, key unresolved issues, and knowledge gaps that hinder the development and widespread use of the products of the proposed research in California. Barriers may be grouped under the following categories, or other categories that the Bidder deems appropriate:

- Scientific and technological – such as insufficient scientific understanding of relevant phenomena and processes, inadequate materials, high cost of

materials, poor durability, low reliability, low power density, low energy density, lack of detailed engineering designs and design trade-off analyses, inadequate component development, high cost of fabrication techniques, lack of automated manufacturing, insufficient field testing, or insufficient field demonstrations.

- Market – such as inadequate consumer knowledge or limited system supply and maintenance infrastructure.
- Institutional – such as regulatory hurdles (e.g., atmospheric emission limitations) or lack of adopted interconnection standards.
- Environmental – such as NOx emissions above those set by Air Resources Boards or Districts within California, excessive noise, or high water consumption.

Explain why these barriers have not been addressed by the marketplace or by other institutions.

Explain why the barriers should be addressed at this time. For example, place the proposed work into the context of the spectrum of barriers to widespread deployment and adoption.

V. Goals of the Agreement

At the beginning of this section, complete the following sentence. Please be succinct.

The goal of this project is to...*(Complete the sentence with a brief description of the goal(s) and how the goal(s) will be met. Goals can be technical, economic or social. Please be brief, two to three sentences maximum.)*

VI. Objectives of the Agreement

The objectives of this project are to...*(Complete this sentence with the objectives, which are things that will be measurable or knowable at the end of **this** project. Bidders should determine performance measures that are applicable to their projects.)*

Examples of Performance Measures:

- . . .reduce the cost of electricity generation (or supply) by ____%.
- . . .increase the number of new technologies that are market-ready by ____<fill in the number>.
- . . . increase the adoption by the market of specific technologies by ____%.
- . . . increase the renewable technologies that are cost competitive by ____%.
- . . . increase the new energy systems that can use multiple fuels by ____%.
- . . . decrease end-use consumption in specific energy sectors.
- . . . decrease the system impacts over current best practices by ____%.
- . . .increase the number of market-ready technologies that contribute to reduced risks of increased environmental/health impacts by ____<fill in the number>.

- . . .reduce the interruption frequency and duration per customer type per year by ____<fill in the number>.
- . . .increase the expected number of new technologies providing increased reliability/quality choices to consumers by ____<fill in the number>.
- . . .decrease the rates of injury and fatality associated with electricity generation/supply and usage by ____<fill in the number>.
- . . .determine the effectiveness of the XYZ process.

After completing the sentences above, discuss how and to what degree your proposed project contributes to technology improvement and market introduction and penetration in California.

VII. Task 1.0 Administration

Except for the optional Tasks 1.10, Establish the PAC (Project Advisory Committee), and 1.11, Conduct PAC Meetings, the administrative tasks must be included in every agreement and the language does not change. Do NOT edit these areas. In contrast, Tasks 1.10 and 1.11 can be modified as needed. If you have questions about the applicability of some of these tasks to your agreement, please ask.

VIII. Project and Technical Tasks (Tasks 2 through n)

This is the area in the Scope of Work where the technical work to be performed under this Agreement is set forth. The work effort should be divided into a series of logical, discrete and sequential tasks for each Project.

Each Project has the following components:

- Project Name
- The goal of this project is to . . .
- Project Objectives:
- Task List

Each task has the following components:

- Task Name
- The goal of this task is to . . .
- The Contractor shall:
- Deliverables

A. The Goal

The goal of this task is to . . .(Complete the sentence with a brief description of the goal(s). Please be brief, two to three sentences maximum.)

B. The Contractor shall

List each individual **activity** with a separate bullet and begin each bullet with a verb to complete the sentence beginning with "The Contractor shall." Organize activities in the

order in which they will occur. A bullet needs to appear before each activity. Use this section to describe the essential elements of **the process** you will use to complete the project. The **contents** of each **deliverable** shall also be described in this section.

For Example:

The Contractor shall:

- Prepare the X Test Plan. This plan shall include, but not be limited to . . .
- Submit the X Test Plan to the Commission Contract Manager . . .
- Conduct research in accordance with the X Test Plan.
- Prepare the X Test Results Report. This report shall include, but not be limited to, the following . . .

(Please note the following:

- **If a project is for demonstration, or if a project involves testing**, one of the tasks should be Test Plan preparation. The Test Plan should include considerations such as the number of hours of operation, the type of monitoring to be preformed, the manner in which data will be validated, analyzed, and reported.)

C. Deliverables:

- 1st deliverable (name only)
- 2nd deliverable (name only)

For Example:

Deliverables:

- X Test Plan
- X Test Results Report

Only the **names** of each deliverable shall appear in the “Deliverables” section. Use exactly the same name to identify a deliverable (report, data set, project plan, etc.) in the activity and in the list of deliverables. A bullet needs to appear before each deliverable.

Deliverables are products that incorporate the knowledge and understanding gained by performing the activities and that are submitted to the Energy Commission. Deliverables include, but are not limited to, written reports that describe methods, test plans, results of testing, analysis of data, conclusions, and recommendations for future study, workshop agendas and summaries, description and photographs of equipment/product developed, summaries of advisory group meetings, computer software with written instructions for data input and use of the software, if intended for public or Energy Commission use, and production prototypes. The sum of the deliverables should be sufficiently detailed to be of use to stakeholders and other researchers. The level of detail should be sufficient for an observer to assess whether the project objectives and goals have been successfully met.

Administrative Task 1.5 in the Scope of Work indicates that PIER contractors must submit both draft and final versions of deliverables. This requirement can be modified for individual deliverables by explaining in the technical task in which the deliverable is listed that there will be no draft version. This is especially appropriate for deliverables such as notification letters that do not need review and comment.

For Example:

Deliverables:

- Notification Letter that X Test Materials Have Been Purchased (No Draft)
- X Test Plan

D. Task n-1 Technology Transfer Activities

If applicable, this section is included in the agreement. Change the language as appropriate for your project.

E. Task n Production Readiness Plan

If applicable, this section is included in the agreement. Change the language as appropriate for your project.

IX. Examples of Different Types of Technical Deliverables *(These are examples that you may modify for use in your project. You may create other deliverables as needed, but please adhere to the patterns shown.)*

1. Notification Letters

- Provide a Notification Letter regarding _____, to the Commission Contract Manager. *(Give it a unique name based on the content and the project.)* The letter shall include but not be limited to written documentation that the _____ is ready for *(testing, viewing, submission for certification, etc.)* and the date such *(testing, viewing, submission for certification, etc.)* shall begin, and shall include photographs.

Deliverables:

- Notification Letter regarding _____ (No Draft Version)

2. Test Plans

- Prepare the _____ Test Plan. *(Give it a unique name, such as "Site A Test Plan." Test plans and testing procedures should be described in detail including factors such as instrumentation, data collection, data analysis, statistical analyses, and performance curves. Test results shall include relationships among performance, efficiency, emissions, temperature, pressure and all other parameters that qualify and quantify the subject technology.)* The Test Plan shall include, but not be limited to:
 - a description of the process to be tested;

- the rationale for why the tests are required;
- predicted performance based on calculations or other analyses;
- test objectives and technical approach;
- a test matrix showing the number of test conditions and replicated runs;
- a description of the facilities, equipment, instrumentation required to conduct the tests;
- a description of test procedures, including parameters to be controlled and how they will be controlled; parameters to be measured and instrumentation to measure them; calibration procedures to be used; recommended calibration interval; and maintenance of the test log;
- a description of the data analysis procedures;
- a description of quality assurance procedures;
- contingency measures to be considered if the test objectives are not met;
- (add additional bullets specific to the project as needed).

Deliverables:

- _____ Test Plan

3. Interim Reports (*This applies to all deliverable reports. Examples include task and subtask reports, test reports, data sets, databases and computer model development or application. Monthly reports and the final report are treated separately as shown in the Scope of Work.*)

- Prepare the _____ Report (*Give it a unique name, such as the ABC Test Report or 123 Database. If an interim report is based on earlier work in this project, then the titles should relate to each other. After the title insert a description of the deliverable.*) This report shall include, but not be limited to, the following: (*List the elements of the report in separate bullets.*)

For example, if the Interim Report is a Test Report, use the following description:

The Test Report shall include, but not be limited to, the following:

- the Test Plan;
- test results;
- analysis;
- conclusions;
- recommendations;
- photographs as appropriate;
- (add additional bullets specific to the project as needed).

For example, if the Interim Report is a Task or Subtask Report, use the following description:

The Task or Subtask Report shall include, but not be limited to, the following:

- the goal of the task or subtask;
- the description of the approach used;

- list of activities performed;
- description of the results and to what degree the goal was achieved;
- significant issues encountered and how they were addressed;
- a discussion of the implications regarding the success or failure of the results, and the effect on the budget and the overall objectives of the project;
- photographs as appropriate;
- (add additional bullets specific to the project as needed).

Deliverables:

- _____ Test (Task, Database, etc.) Report

4. Use this pattern for reports that will be discussed at a Critical Project Review.

- Prepare the Draft _____ (Report, Test Plan, etc.). This document shall be submitted to the Commission Contract Manager in accordance with the procedure for Critical Project Reviews. This document shall include, but not be limited to the following: (Insert the appropriate bulleted items for either Test Plans in number 2 above or Reports in number 3 above.)

[Note: If the Critical Project Review is being held at a certain point of time in the project and is not associated with a specific technical deliverable's completion, then use just the following highlighted bullet points in the technical task information. Use only the deliverable highlighted below.]

- Prepare the (1st, 2nd, etc.) Critical Project Review Report.
- Participate in the (1st, 2nd, etc.) Critical Project Review.
- Modify the Draft _____ (Report, Test Plan, etc.) in accordance with comments received during the Critical Project Review. Once agreement has been reached on the draft, the Contractor shall submit the final deliverable to the Commission Contract Manager. The Commission Contract Manager shall provide written approval of the final deliverable within 10 working days of receipt. Key elements from this document shall be included in the Final Report for this project.

Deliverables:

- Draft _____ (Report, Test Plan, etc.)
- (1st, 2nd, etc.) Critical Project Review Report(s)
- Final _____ (Report, Test Plan, etc.)

5. Bills of Materials or Equipment Lists

- Prepare a Bill of Materials (or Equipment List) for _____. *(Give it a unique name.)* This document shall include but not be limited to:
 - a description of each item;
 - test protocols and codes applicable to each item;
 - cost estimates or bids for each item.

Deliverables:

- Bill of Materials (or Equipment List) for _____

6. Site Selection (optionally, this language can be incorporated into a Test Plan)

- Determine Site Selection Details for the field test site, including but not limited to the following, and obtain Commission Contract Manager approval:
- Type of site, i.e.,
 - Residential
 - Specify type of dwelling: single family, multiple family including number of units, apartment, townhouse, etc.
 - Specify age of dwelling: new home construction, model home, existing home (indicate approximate age)
 - Commercial (specify warehouse, retail, office, etc.)
- Number of sites
- Location, i.e., climate zone, area, or city
- Timing of testing (i.e., season or month), length and frequency of testing
- Agreement with site owner, to addresses issues such as:
 - Details of test, including dates, length of test
 - Site owner input and feedback on test conditions
 - Access to site
 - Insurance and indemnity
 - Contingency if damages are caused by test
 - Equipment installation and removal

Once the site is selected, Contractor shall enter into an agreement with the site owner and make a copy of the agreement available to the Commission Contract Manager upon request.

X. Examples of Technical Tasks**| Task 2.1 Develop EGR and Control System On Engine**

The goal of this task is to evaluate rich burn EGR engine performance with the pre-production hardware and control system for implementation of EGR on a VGF H24 engine.

The Contractor shall:

- Prepare the Rich Burn EGR Engine Test Plan. This Test Plan shall detail the performance evaluation of the rich burn EGR engine. The Test Plan shall include, but not be limited to, the following:
 - a description of the engine system;
 - rationale for conducting the tests;
 - predicted performance based on calculations or other analyses;
 - test objectives and technical approach;
 - a test matrix showing the number of test conditions and replicated runs;
 - a description of the facilities, equipment, instrumentation required to conduct the tests;
 - a description of test procedures, including parameters to be controlled and how they will be controlled; parameters to be measured and instrumentation to measure them; calibration procedures to be used; recommended calibration interval; and maintenance of the test log;
 - a description of the data analysis procedures;
 - a description of quality assurance procedures;
 - contingency measures to be considered if the test objectives are not met.
- Conduct testing as outlined in the Rich Burn EGR Engine Test Plan. This testing shall map engine performance with respect to EGR and equivalence ratio effects on efficiency and emission.
- Prepare the Rich Burn EGR Performance Report. This document shall include, but not be limited to, the following:
 - the goal of the task or subtask;
 - the description of the approach used;
 - list of activities performed;
 - description of the results and to what degree the goal was achieved;
 - significant issues encountered and how they were addressed;
 - a discussion of the implications regarding the success or failure of the results, and the effect on the budget and the overall objectives of the project;
 - photographs as appropriate.

Deliverables:

- Rich Burn EGR Engine Test Plan
- Rich Burn EGR Performance Report

Task 3-2.2 4000-Hour Field Test (Note the use of the Critical Project Review)

The goal of this task is to demonstrate the performance of a rich burn EGR engine in a field environment. The field site will be located in California, and a three-way catalyst will be installed on the exhaust to reduce emissions below current California standards.

The Contractor shall:

- Prepare the 4000-Hour Field Test Plan. This Test Plan shall detail the field testing of the rich burn EGR engine at a California location. The Test Plan shall include, but not be limited to, the following:
 - a description of the engine system;
 - rationale for conducting the tests;
 - predicted performance based on calculations or other analyses;
 - test objectives and technical approach;
 - a test matrix showing the number of test conditions and replicated runs;
 - a description of the facilities, equipment, instrumentation required to conduct the tests;
 - a description of test procedures, including parameters to be controlled and how they will be controlled; parameters to be measured and instrumentation to measure them; calibration procedures to be used; recommended calibration interval; and maintenance of the test log;
 - a description of the data analysis procedures;
 - a description of quality assurance procedures;
 - contingency measures to be considered if the test objectives are not met.
- Determine Site Selection Details for the field test site, including but not limited to the following, and obtain Commission Contract Manager approval:
 - Type of site, i.e.,
 - Residential
 - Specify type of dwelling: single family, multiple family including number of units, apartment, townhouse, etc.
 - Specify age of dwelling: new home construction, model home, existing home (indicate approximate age)
 - Commercial (specify warehouse, retail, office, etc.)
 - Number of sites
 - Location, i.e., climate zone, area, or city
 - Timing of testing (i.e., season or month), length and frequency of testing
 - Agreement with site owner, to address issues such as:
 - Details of test, including dates, length of test
 - Site owner input and feedback on test conditions
 - Access to site
 - Insurance and indemnity
 - Contingency if damages are caused by test
 - Equipment installation and removalOnce the site is selected, Contractor shall enter into an agreement with the site owner and make a copy of the agreement available to the Commission Contract Manager upon request.
- Run engine break-in and power testing per standard engine test procedures at Jane Doe Engine.
- Run engine-generator system load testing per standard test procedures at Jane Doe Power Systems.

- Provide a Notification Letter regarding 4000-Hour Field Test, to the Commission Contract Manager. The letter shall include, but not be limited to, the following:
 - written documentation that the 4000-Hour Field Test is ready for testing;
 - the date testing shall begin;
 - photographs as appropriate.
- Conduct testing as outlined in the 4000-Hour Field Test Plan. This testing will monitor engine performance and emissions over 4000-hours of operations.
- Prepare the Draft 4000-Hour Field Test Report. This document shall be submitted to the Commission Contract Manager in accordance with the procedure for Critical Project Reviews. This document shall include, but not be limited to, the following:
 - the Test Plan;
 - test results;
 - analysis;
 - conclusions;
 - recommendations;
 - photographs as appropriate.
- Prepare the 1st Critical Project Review Report.
- Participate in the 1st Critical Project Review.
- Modify the Draft 4000-Hour Field Test Report in accordance with the comments received during the Critical Project Review. The final version of this document shall be submitted to the Commission Contract Manager within 10 working days after the Critical Project Review. The Commission Contract Manager shall send written notification of approval to the Contractor within 5 working days after receipt. Key elements from this document shall be included in the Final Report for this project.

Deliverables:

- 4000-Hour Field Test Plan
- Notification Letter regarding 4000-Hour Field Test (No Draft Version)
- Draft 4000-Hour Field Test Report
- 1st Critical Program Review Report
- Final 4000-Hour Field Test Report